



**WYOMING DEPARTMENT OF AGRICULTURE
ANALYTICAL SERVICES**

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**EVALUATION AND CLASSIFICATION SYSTEM
FOR IRRIGATION WATERS**

SALINITY

(Salt Hazard)

Class 1, Low Salinity: Good water with little or no likelihood of salt accumulation when normal irrigation practices are followed.

Class 2, Medium Salinity: Can be used if a moderate amount of excess water is applied to provide some leaching. Plants with moderate salt tolerance can be grown without serious yield reduction when normal cropping practices are followed.

Class 3, High Salinity: Cannot be used on clay soils or soils with poor drainage. With adequate drainage, considerable excess water should be applied to provide leaching. Irrigations must be more frequent than normal and soil should be maintained relatively wet. Crops with medium or high salt tolerance should be grown to maintain normal yields. This water is not recommended for use under sprinkler application methods unless leaching is practiced.

Class 4, Very High Salinity: Not suitable for irrigation under ordinary conditions. May be used occasionally on sandy soils with excellent drainage if considerable excess water is applied for leaching and if crops with high salt tolerance are grown. Should not be used for continuous irrigation and is not suitable for use with sprinkler systems.

ALKALINITY

(Sodium Hazard)

Class 1, Low Sodium: Good water, that can be used safely on most soils in Wyoming.

Class 2, Medium Sodium: Suitable for use on sandy and loamy soils if water moves through them readily. Can cause alkali problems on heavy clay soils, under low leaching conditions, unless gypsum (or equivalent soil amendments) are present or are added to the soil.

Class 3, High Sodium: May produce harmful levels of exchangeable sodium in all soils and will require special management -- good drainage, high leaching and additions of organic matter. Soils containing natural gypsum or other chemical amendments may make the water usable, but it is not feasible if the water is also high in salinity (Class 3 or 4). This water will cause surface soil particles to puddle, thus limiting water penetration.

Class 4, Very High Sodium: Generally unsatisfactory for irrigation. Special conditions of low salinity water, favorable gypsum content of soils, high leaching and special management may permit use of this water. A complete soil analysis is recommended prior to any use of this water.

BORON

Limits expressed in milligrams/liter (ppm)

<u>Class</u>	<u>Sensitive Crops</u>	<u>Semi-tolerant Crops</u>	<u>Tolerant Crops</u>	<u>Description</u>
1	< 0.33	< 0.67	< 1.00	Very low, no effect on crops.
2	0.33 to 0.67	0.67 to 1.33	1.00 to 2.00	Low, very slight effect on crops.
3	0.67 to 1.00	1.33 to 2.00	2.00 to 3.00	Moderate, significant yield depression.
4	1.00 to 1.25	2.00 to 2.50	3.00 to 3.75	High, large yield depression anticipated.
5	> 1.25	> 2.5	> 3.75	Very high, non-usable

Boron is not generally a problem in Wyoming, but where it is present in irrigation water in large enough amounts, it is extremely toxic to plants and may severely effect yields. Classification numbers given in the report refer to the values for semi-tolerant crops.

SELENIUM

Class	Limits expressed in milligrams/liter (ppm)	Description
1	0.00 to 0.10	Low, no plant toxicity anticipated.
2	0.11 to 0.20	Medium, usable - possible long-term accumulation under particular conditions and should be monitored.
3	0.21 to 0.50	High, probably toxic accumulation in plants if this is the only source of water.
4	>0.50	Very high, non-usable under any conditions.

Selenium is a naturally occurring element in many Wyoming soils and is only rarely found in Wyoming waters above the concentration of 0.01 milligrams/liter. Many plant species have the ability to take up and to concentrate selenium, thus creating a potentially hazardous situation for livestock and humans. High selenium levels in the soil will be more hazardous under irrigation than dry conditions even though the irrigation water is good. Caution should be exercised when using irrigation

drainage, impounded drainages or water from shallow aquifers near or within irrigated areas containing seleniferous soils. Extremely good drainage from these soils is very important. For more information on selenium refer to REPORT TO THE GOVERNOR, Selenium In Wyoming, Issues and Recommendations, Governors Task Force on Selenium, June 1989.

RESIDUAL SODIUM CARBONATE

Class	Limits expressed in milliequivalents/liter (meq/L)	Description
1	less than 1.25	Safe, no augmented alkali problems over those listed under alkali rating.
2	1.25 to 2.50	Marginal, possibility of some increase in alkali over those listed under alkali rating.
3	greater than 2.50	Not suitable, for irrigation under most circumstances.

The presence of carbonates and bicarbonates in excess of the calcium and magnesium may develop alkali problems over and above those considered in the ALKALI rating. Excessive amounts of sodium carbonate will cause severe puddling of soils, limit water penetration if any fine particles are present in

the soil, and in severe cases, will decompose organic matter in the soil creating black alkali conditions. The long term effects of residual sodium carbonate must be considered since they are cumulative.

Additional Information

For the best results the agriculture producer should have the soil(s) analyzed on which this water will be applied. Soil analyses can be obtained through the University of Wyoming College of Agriculture's Soil Testing Laboratory. You can contact the laboratory at 307-766-2135, via e-mail at soiltest@uwyo.edu or through the Cooperative Extension Office in your county.

INFORMATION SOURCES

- (1) Agriculture Extension Service, College of Agriculture, University of Wyoming
- (2) Diagnosis and Improvement of Saline and Alkali Soils, USDA Handbook No. 60, 1954